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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/963,419	09/27/2001	Michio Ono	Q66438	8980

7590

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EXAMINER

MUTSCHLER, BRIAN L

ART UNIT

PAPER NUMBER

1753

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/963,419

Applicant(s)

ONO, MICHIO

Examiner

Brian L. Mutschler

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1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Comments

1. The rejection of claims 1-5 and 8-17 under 35 U.S.C. 112, second paragraph, has been overcome by Applicant's amendment.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 6 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation "differential response-type" in lines 3-4. The addition of the word "type" to an otherwise definite expression extends the scope of the claim so as to render the claim indefinite. (See MPEP § 2173.05(b).) The same applies to dependent claim 7.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyasaka (U.S. Pat. No. 5,107,104) in view of Ohmori (U.S. Pat. No. 6,300,559).

Miyasaka discloses a differential response light-receiving device having a semiconductor electrode **2** comprising a semiconductor sensitized by a dye **3**, an ion-conductive electrolyte **6**, and a counter electrode **5** (fig. 1; col. 4, lines 5-15). The device makes a time-differential response to light to output a current (fig. 4).

Regarding claim 2, the electrolyte is free of redox species (col. 5, lines 13-49). The absence of redox species is evidenced by the differential response of the device as shown in figure 4.

Regarding claims 3 and 4, the semiconductor is a metal chalcogenide comprising SnO₂ or ITO, indium tin oxide (col. 4, lines 40-51).

The device of Miyasaka differs from the instant invention because Miyasaka does not disclose a separate electrically conductive layer in the semiconductor electrode. In the device of Miyasaka, leads are attached directly to the photosensitive layer.

Ohmori discloses a dye-sensitized stationary response light-sensitized device having a semiconductor electrode comprised of a transparent electrode **2** and a photosensitive layer comprising a semiconductor **3** sensitized by a dye **4**, an electrolyte layer **5** containing a redox species, and a counter electrode **6** (fig. 1; col. 1, lines 26-37; col. 4, lines 17-24). Both the transparent electrode **2** and semiconductor **3** are made of chalcogenides (col. 2, lines 57-64). Using a separate electrode **2** and semiconductor **3** allows the electrode to be designed for good transfer properties between the

semiconductor and leads and the semiconductor to be designed for good photoelectric conversion efficiency.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the semiconductor electrode in the device of Miyasaka to use a separate semiconductor and conductive layer as taught by Ohmori because using a separate electrode and semiconductor allows the electrode to be designed for good transfer properties between the semiconductor and leads and the semiconductor to be designed for good photoelectric conversion efficiency.

6. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyasaka (U.S. Pat. No. 5,107,104) in view of Ohmori (U.S. Pat. No. 6,300,559), as applied above to claims 1-4, and further in view of Yu et al. (U.S. Pat. No. 6,300,612).

Miyasaka and Ohmori describe a device having the limitations recited in claims 1-4 of the instant invention, as explained above in section 5.

The device described by Miyasaka and Ohmori differs from the instant invention because they do not disclose the following:

- a. A plurality of semiconductor electrodes sensitive to different wavelengths, as recited in claim 5;
- b. A plurality of semiconductor electrodes arranged in order of increasing wavelength sensitivity from the light-incident side of the device, as recited in claim 6; and

- c. A plurality of semiconductor electrodes comprising a blue-sensitive electrode, a green-sensitive electrode and a red-sensitive electrode, in that order from the light-incident side, as recited in claim 7.

Yu discloses an image sensor made from dye-sensitized semiconductors and electrolytes (col. 10, lines 18-65). A plurality of semiconductor electrodes are used in a stack configuration, with a blue-sensitive electrode, a green-sensitive electrode and a red-sensitive electrode stacked in that order from the light incident side of the electrode (fig. 3A and 3B). The use of a plurality of wavelength-sensitive electrodes allows the device to be responsive to the full-color spectrum, and the stacked array allows the sensing area of each wavelength-sensitive electrode to the total pixel size without absorbing the responsive wavelengths of the other layers (col. 14, lines 8-15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the semiconductor electrode in the device described by Miyasaka and Ohmori to use a plurality of wavelength-sensitive electrodes including blue-, green-, and red-sensitive electrodes, as taught by Yu, because a plurality of electrodes allows the device to be responsive to the full-color spectrum.

7. Claims 8, 10-12, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyasaka (U.S. Pat. No. 5,107,104) in view of Ohmori (U.S. Pat. No. 6,300,559), as applied above to claims 1-4, and further in view of Inada et al. (U.S. Pat. No. 4,985,618).

Miyasaka and Ohmori describe a differential response device having the limitations recited in claims 1-4 of the instant application, as explained above in section 5.

Regarding claims 10-12, Ohmori discloses a dye-sensitized stationary response light-sensitized device having a semiconductor electrode comprised of a transparent electrode **2** and a photosensitive layer comprising a semiconductor **3** sensitized by a dye **4**, an electrolyte layer **5** containing a redox species, and a counter electrode **6** (fig. 1; col. 1, lines 26-37; col. 4, lines 17-24). Both the transparent electrode **2** and semiconductor **3** are made of chalcogenides (col. 2, lines 57-64).

The device described by Miyasaka and Ohmori differs from the instant invention because they do not disclose a composite light-receiving device comprised of a differential response and a stationary response device, as recited in claim 8, or an image sensor comprising a plurality of pixels each comprised of the composite light-receiving device, as recited in claims 16 and 17.

Inada et al. disclose an image sensor comprising plurality of pixels (array) containing a differential response device and stationary response device (fig. 8(C); col. 1, line 57 to col. 2, line 21). The system is used to provide motion-detection capability using the differential response signal to detect edges (col. 2, lines 10-21).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the device of Miyasaka to use the differential response device with a stationary response device, as disclosed by Ohmori, in a composite light-receiving device or an image sensor as taught by Inada et al. because

using a differential response device and a stationary response device allows for motion-detection capabilities and image-sensing capabilities in a unitary device.

8. Claims 9 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyasaka (U.S. Pat. No. 5,107,104) in view of Ohmori (U.S. Pat. No. 6,300,559) and in view of Inada et al. (U.S. Pat. No. 4,985,618), as applied above to claims 8, 10-12, 16 and 17, and further in view of Yu (U.S. Pat. No. 6,300,612).

Miyasaka, Ohmori and Inada et al. describe a device having the limitations recited in claims 8, 10-12, 16 and 17, as explained above in section 7.

The device described by Miyasaka, Ohmori and Inada et al. differs from the instant invention because they do not disclose the following:

- a. A composite light-receiving device wherein the differential response device and stationary response device are stacked, as recited in claim 9;
- b. A plurality of semiconductor electrodes sensitive to different wavelengths, as recited in claim 13;
- c. A plurality of semiconductor electrodes arranged in order of increasing wavelength sensitivity from the light-incident side of the device, as recited in claim 14; and
- d. A plurality of semiconductor electrodes comprising a blue-sensitive electrode, a green-sensitive electrode and a red-sensitive electrode, in that order from the light-incident side, as recited in claim 15.

Yu discloses an image sensor made from dye-sensitized semiconductors and electrolytes (col. 10, lines 18-65). A plurality of semiconductor electrodes are used in a stack configuration, with a blue-sensitive electrode, a green-sensitive electrode and a red-sensitive electrode stacked in that order from the light incident side of the electrode (fig. 3A and 3B). The use of a plurality of wavelength-sensitive electrodes allows the device to be responsive to the full-color spectrum, and the stacked array allows the sensing area of each wavelength-sensitive electrode to the total pixel size without absorbing the responsive wavelengths of the other layers (col. 14, lines 8-15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the differential response device and the stationary response device in the composite light-receiving device described by Miyasaka, Ohmori and Inada et al. to use stacked devices as taught by Yu because using stacked devices allows the sensing area of each electrode to be exposed over the entire pixel size.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the semiconductor electrode in the device described by Miyasaka, Ohmori and Inada et al. to use a plurality of wavelength-sensitive electrodes including blue-, green-, and red-sensitive electrodes, as taught by Yu, because a plurality of electrodes allows the device to be responsive to the full-color spectrum.

R sponse to Arguments

9. Applicant's arguments filed February 4, 2003, have been considered but are not persuasive.
10. Regarding the rejection of claims 1-17, Applicant has argued that Miyasaka teaches "a photosensitive chromoprotein oriented film 3" (see page 7 of Applicant's response; emphasis added by Applicant). Applicant further states, "The photosensitive chromoprotein of Miyakasa is a biosubstance used as a photoreceptor and may be selected from among proteins originating from a living organism and derivatives thereof capable of absorbing light and efficiently converting the photoenergy into chemical work, for example, from the rhodopsin family including rhodopsin, bacteriorhodopsin [*sic*], etc. (sec column 5, lines 50-59), different from the dye in the photosensitive layer in the present invention" (see pages 7-8 of Applicant's response).
11. This argument is not persuasive because chromoproteins such as rhodopsin and its derivatives are dyes. Miyasaka discloses that rhodopsin is a "visual pigment", i.e., it is a coloring material (col. 5, lines 50-64). The chromoprotein disclosed by Miyasaka and the dye of the instant invention function identically; both compounds are capable of absorbing light and efficiently converting the photoenergy into chemical work.
12. Chromoproteins, by definition, are "any of various proteins (as hemoglobins, carotenoids, or flavoproteins) having a pigment as a prosthetic group" (see "chromoprotein" as defined in the Merriam-Webster Dictionary). Furthermore, in JP 3-205520 A, Miyasaka discloses a similar differential-response device using a chromoprotein, wherein "the photosensitive dye protein is preferably bacteriorhodopsin

or the deriv. thereof" (see English abstract). Further evidence that chromoproteins are dyes is provided in U.S. Pat. No. 5,120,325 issued to Dow, Jr., wherein the use of coloring dyes is disclosed, wherein "the pigments can also be organic pigments such as rhodopsin...and synthetic pigments such as phthalocyanines" (see col. 3, lines 46-68). It is noted that phthalocyanines are used as dyes in the instant invention (see page 18 of the instant disclosure).

13. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., current density and output) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Since Miyasaka teaches the use of a dye, as recited in the instant claims, it is the Examiner's position that the combination of Miyasaka and Ohmori teaches all of the limitations of the instant claims.

14. Applicant further argues the combination of Miyasaka and Ohmori because "Ohmori does not teach or suggest a differential response light-receiving device using the photosensitive layer as such " (see page 9 of Applicant's response).

15. This argument is not persuasive because device of Ohmori teaches the formation of a separate electrically conductive layer in the semiconductor electrode, as recited in claim 1. It would have been obvious to one skilled in the art to use such a conductive layer because it enhances the transfer properties between the semiconductor and the

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leads. Both Ohmori and Miyakasa disclose devices for the generation of electrical energy using dye-sensitized layers.

Conclusion

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (703) 305-0180. The examiner can normally be reached on Monday-Friday from 8:00am to 4:30pm.

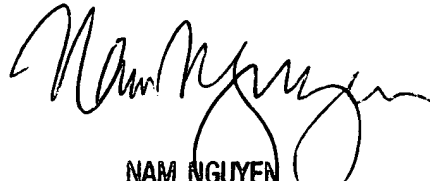
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

blm
March 5, 2003



NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700